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Audiovisual/Video Communications

December 12, 1996

Mr. Elliot Maxwell
Federal Communications Commission
1919 M Street NW
Washington, DC 20554

Dear Mr. Maxwell,

Dr. Eric Tangalos requested that I respond to the technical questions posed in your recent Telecommunications and Health Care Advisory Committee document. As Administrator for the Mayo TeleHealthcare Center, it is my pleasure to do so.

In reference to the chart on page 4, due to the varied and complex nature of the numerous levels of telemedicine at Mayo Clinic, it is impossible to respond to the questions posed in a matrix format. I will attempt to summarize transmission modalities in consideration of the questions.

Question 1: What level of bandwidth are you currently using?
Mayo uses various bandwidths for various applications. For strict teleradiology transmission of still images, we use dial-up analog phone lines or dial-up ISDN. For transmission of video-based imaging such as echocardiography, we use 3/4 T-1 (1.152 Mbps). For face-to-face consultation we have used rates from 112 Kbps up to T-1, however when real-time motion diagnostic imaging is an element of the consultation, we require 1.152 Mbps as a minimum.

Question 2: What is the monthly rate for this service (on average)?
Dial-up ISDN is $69.00/month for 200 hours service, through our local provider in Rochester, MN. This is for local loop only and does not include long-distance charges (which accrue at standard AT&T tariff rate). This is the urban rate.

For T-1 service, we pay rates from $200/month to $4,500/month depending upon the destination.

Question 3-5. Related to rate levels:
Because of the number of locations, both rural and urban, and the number of service providers involved in our various scenarios, it is impossible to provide meaningful cost estimates related to these questions.

Question 6. Would an infrastructure upgrade be required?
At our larger facilities we are equipped to handle and distribute data services including Token Ring, 10Base T EtherNet, 100Base T EtherNet, and FDDI, and are moving toward ATM. At the smaller, more rural facilities, some infrastructure upgrade would be necessary. Externally, we have found that few of the smaller local service providers have any type of digital switched service, so I believe the greater infrastructure upgrades would be at the telco level.

Question 7. If any level of bandwidth were available to you at the rate charged for the same service in the nearest urban area, which level would you choose?
If the rates were not distance sensitive, in most cases we would opt for T-1 or greater. The optimum would be a switched multimegabit service allowing flexible bandwidth and dynamic bandwidth allocation, while allowing packetized transmission.

PAGE 5 QUESTIONS:

We have local Internet access through several different providers.

Related to inter-LATA charges, there is often a significant but unpredictable mileage charge included in our transmission costs. For example, T-1 connectivity cost between Mayo Clinic Rochester and an affiliated clinic in Albert Lea, MN is ≈ $700/month. Connectivity between Mayo Rochester and our clinic in Decorah, IA is almost $4,500/month even though Albert Lea and Decorah are equidistant from Rochester.

The relative value of ISDN or any other transmission medium varies by case, acuity, purpose, and financial factors. For example, an ISDN line is of excellent value in sending radiographs and data coincident to a consultation, provided the originating site has the necessary equipment to compress the data to a level sufficient for rapid transmission. This implies robust technology at the originating site (which is often least able to afford it). If you are dealing with emergent situations, any bandwidth will help. For the bread-and-butter telemedicine consultations, assuming rural to urban transmission, the greater the bandwidth the less costly the equipment at the originating site.

Through wavelet compression, we can transmit a full 2K X 2K X 12bit radiograph over standard analog phone lines in under 1 minute. It takes $75,000 to $100,000 worth of equipment at the originating end do this. With a 384Kbps line, the originating site can send a video-based still image of an x-ray, at low resolution, but possibly have the same result as the full-resolution image: namely reducing the patient situation to a non-critical level. How do you judge the relative value of the transmission medium when, in either case, the job gets done. The key is the ability to have reliable, flexible, demand-based

bandwidth which would allow the application and the criticality drive the transmission speed dynamically.

At this state in it's development, telemedicine should never be substituted for direct patient care. High-touch is the goal; but when the only option is no-touch, perhaps high-tech will suffice.

Mayo uses telemedicine for several key reasons:

- Provide distant practitioners access to Mayo consultants for patient consultations
- Reduce instances of travel, either for the physician or the patient
- Provide case-management education to remote physicians
- Follow-up on patients who have been treated at Mayo then return home

I hope this information is helpful. If you have any further questions or comments, I would be happy to be of service.

Sincerely,

Marvin P. Mitchell
Mayo TeleHeathcare Center

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